TITLE

VERTICAL SLIDE CLIP

INVENTOR

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Cross Reference To Related Applications

[0001] This application is a continuation application of U.S. Patent Application Serial No. 09/912,098 to Rahim Allagheband Zadeh, filed July 24, 2001 and entitled Vertical Slide Clip and which claims the benefit of U.S. Provisional Patent Application Serial No. 60/220,420, filed July 24, 2000.

Technical Field

[0002] This invention relates to steel stud building systems, and, more particularly to brackets for connecting vertical steel wall studs to a building structure in a manner to permit relative vertical movement but prevent relative horizontal movement therebetween.

Background of the Invention

[0003] Many industrial and commercial buildings and an increasing number of residential buildings are being constructed with steel stud wall systems for the various benefits obtained, such as reduced environmental concerns, fire safety and reduced susceptibility from warpage, insects, rust and rot.

[0004] In the construction of buildings that may be subject to deflection due to wind or seismic forces, it is preferable to allow a degree of freedom of movement to reduce stress and to prevent fracture of connected parts. Ceilings often must rest directly on a structural frame or on load-bearing walls. Curtain walls, meaning walls such as partition walls which are not intended to support vertical loads, are best designed to not support vertical loads due to deflection of the primary load-bearing support structure of the building. Deflection is due to changes in the live loads.

[0005] In addition to the occurrence of wind induced or seismic stress loading of a building structure, building component deflection is caused by changes in live or dead loading of the floor below or the ceiling above the curtain wall. However, typical prior construction systems have been designed so that all parts of a building are connected in a rigid and permanent fashion. When such a building structure is stressed, curtain walls tend to be damaged and the degree of damage sustained by other building parts is also increased.

Summary of the Invention

[0006] It is therefore an object of this invention to provide an apparatus for connecting a curtain wall to the primary structure so as to allow relative vertical movement therebetween while restricting relative horizontal movement.

[0007] Additional objects, advantages and other novel features of the invention will be set forth in part in the description that follows and in part will become apparent to those skilled in the art upon examination of the following or may be learned with the practice of the invention as described and claimed herein.

[0008] To achieve the foregoing and other objects, and in accordance with one aspect of the present invention, an improved bracket for connecting a pair of substantially perpendicular building components is provided. The bracket of the present invention advantageously allows relative vertical movement between the perpendicular building components. Preferably, the bracket includes a first connector plate joined at an edge and aligned with a second connector plate in substantially a right angle to form a right-angled juncture.

[0009] A number of substantially triangular stiffener channels are disposed in the right-angled juncture each having a substantially U-shaped cross section. Additionally, a number of substantially linear stiffener channels are provided in the first connector plate that preferably each extend from a corresponding triangular stiffener channel.

[0010] The second plate includes a number of elongated slots through which the plate may be connected with a shoulder crew or the like to a building component. The slot allows for vertical movement of the building structure without transferring compressive loads to the building component connected to the second plate, such as an exterior curtain wall. The first plate may be

connected to structural framing of the building. When the structural framing of the building flexes downward, the bracket of the present invention allows for relative vertical movement thus relieving stresses and eliminating and resisting horizontal forces caused by wind or seismic loads.

[0011] Still other objects of the present invention will become apparent to those skilled in this art from the following description and drawings wherein there is described and shown preferred embodiments of the invention. As will be realized, the invention is capable of other different embodiments, and its several details are capable of modification in various, obvious aspects all without departing from the invention. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.

Description of the Drawings

[0012] The accompanying drawings incorporated in and forming a part of the specification illustrate several aspects of the present invention, and together with the description and claims serve to explain the principles of the invention. In the accompanying drawings:

[0013] Figure 1 is a perspective view of a first preferred embodiment of the bracket of the present invention;

[0014] Figure 1A is a cross-sectional view of the bracket of Figure 1 taken along plane 19 in Figure 1;

[0015] Figure 1B is a cross-sectional view of the bracket of Figure 1 taken along plane 17 in Figure 1;

[0016] Figure 2 is a perspective view of the bracket of Figure 1 installed between a non-load bearing vertical stud and a horizontal structural I-beam so as to permit relative vertical movement between the two structures;

[0017] Figure 3 is a perspective view of a second preferred embodiment of the bracket of the present invention;

[0018] Figure 4 is a perspective view of a third preferred embodiment of the bracket of the present invention;

[0019] Figure 5 is a perspective view of a fourth preferred embodiment of the bracket of the present invention; and

[0020] Figure 6 is a perspective view of a fifth preferred embodiment of the bracket of the present invention.

Detailed Description of the Invention

[0021] Reference will not be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings wherein like numerals indicate corresponding elements throughout the figures.

[0022] Figure 1 illustrates generally at 10 a preferred embodiment of the bracket of the present invention. Bracket 10 is preferably comprised of a stiff, durable, and thin material such as galvanized sheet steel. Preferably, the bracket 10 of the present invention is comprised of 14-gauge sheet steel having a thickness of about 0.07 inches. Depending on the need of the given construction environment, it should be appreciated that the thickness of the bracket 10 may be of essentially any commercially available sheet steel regardless of gauge or thickness. As best seen in Figure 1, the bracket 10 includes a substantially planar first connector plate 14 and a substantially planar second connector plate 12. As seen in Figure 1, the first connector plate 14 and the second connector plate 12 are integrally joined so as to form a right angled juncture along corresponding edges of the first and second connector plates 14, 12, respectively.

[0023] According to an important aspect of the present invention, and as seen in Figure 1, a plurality of substantially triangular stiffener channels 16 are disposed at the intersection of the first and second connector plates 41, 12, respectively. Preferably, each of the triangular stiffener channels 16 has a substantially U-shaped cross-section in a plane (designated as 17 in Figure 1) parallel with the first connector plate 14. See Figure 1A. Additionally, each of the triangular stiffener channels 16 are also substantially U-shaped in cross-section in a plane (designated as 19 in Figure 1) parallel with the second connector plate 12. See Figure 1B. Advantageously, the triangular stiffener channels are provided to increase the rigidity and stiffness of the bracket 10.

[0024] Additionally, and as seen in Figure 1, a number of linear stiffener ridges or channels 18 are provided (preferably in the first connector plate 14). More preferably, the linear stiffener channels 18 are disposed perpendicularly with the second connector plate 12 and extend from an end of a corresponding triangular stiffener channel 16. Preferably, the triangular stiffener channel 16 with corresponding linear stiffener channels 18, are spaced evenly across a length of the first connector plate 14.

[0025] As can be seen in Figures 1 and 2, the second connector plate 12 is provided with one or more elongated slots 24 adapted to receive a fastener such as a shoulder screw. Preferably, all of the elongated slots 24 are substantially parallel with each other. In order to add additional rigidity to the bracket 10, each of the elongated slots 24 may be disposed within a slot stiffener region 28. Stiffener 28 is preferably made by punching a channel around the region of each slot 24. More preferably, the stiffener 28 comprises $1/16^{th}$ inch round punched stiffener region. In order to aid an installer, measurement indicia 26 may also be provided along the length of each slot 24.

[0026] Additionally, and as shown in Figure 1, a plurality of substantially dimples 20 may be provided to aid an installer with placement of fasteners to be inserted through the first connector panel 14. Additionally, and again in an effort to assure the accurate placement of the fasteners through the first connector plate, a score mark 30 may be provided through the dimples 20.

[0027] With reference to Figure 2, the bracket 10 of the present invention is shown in a portion of an assembled building structure. The first connector plate 14 is shown being attached to a length of angled flange 102 which is attached to a load bearing structural I-beam 104. The first connector plate 14 may be attached to the load-bearing structural components in any suitable manner known in the art.

[0028] Preferably, a shoulder screw 32 is provided to attach the second connector plate 12 to a non-load-bearing stud 100. Preferably, the shoulder screws 32 provide substantially smooth slidable vertical movement relative to the second connector plate 12 and the non-load-bearing stud 100. Advantageously, when the structural framing (i.e., the structural I-beam 104) is subject to loading and deflected downwardly, the bracket of the present invention allows for vertical movement of the building structure without transferring compressive loads to the non-load

bearing stud 100 or associated curtain wall. Accordingly, the exterior curtain wall stud may be attached to the supporting structure 104 while resisting horizontal forces and stresses caused by wind and other seismic loading. As a result, horizontal forces are resisted while the bracket 10 simultaneously provides for the vertical deflection of the primary building structure.

[0029] With reference to Figure 3, an alternate embodiment 10a of the bracket is shown having elongated slots 24 that are orientated perpendicularly with the juncture of first and second connector plates 14, 12, respectively. Depending on the configurations of the given components to be connected, the bracket 10a may be used to promote vertical deflection as described above.

[0030] As shown in Figure 4, yet an additional embodiment of the present invention 10b, is depicted wherein one or more rows of holes 34 may be provided in place of the slots 24 of prior described embodiments. Preferably the holes 34 are surrounded by a stiffener region 28, much like the stiffener region 28 of the slotted embodiments of the invention. The embodiment of Figure 10b is advantageous in those situations where little or no vertical deflection is desired or likely to occur between the building components being connected with the bracket 10b.

[0031] With reference to Figure 5, yet an additional embodiment of the bracket 10c is shown with an alternate arrangement of slots 24. Similar to the embodiment shown in Figure 3, the embodiment shown in Figure 5 is advantageous when the bracket 10c is linking building components where freedom of movement is desired in a direction perpendicular with the right angle juncture of the bracket 10c.

[0032] An additional preferred embodiment of the bracket of the present invention is indicated generally by the reference numeral 10d in Figure 6. This embodiment is similar to that shown in Figure 5 except that rows of holes 34 are provided instead of a plurality of slots 24. Preferably, all alternative embodiments include the triangular stiffener channels 16 and a number of linear stiffener channels 18 to provide additional structural integrity.

[0033] The foregoing description of a preferred embodiment of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the above teachings. The embodiments were chosen and described in order to best illustrate

the principles of the invention and their practical application to thereby enable one of ordinary skill in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims attended hereto.